

**REMARKS/ARGUMENTS**

Reconsideration of the above-identified application in view of the present amendment is respectfully requested. Claims 1-8, 12-21, and 24-36 are pending.

Claims 1-4, 13-15, 20-21, 25, 26, and 29-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0114662 to Messler ("Messler") in view of U.S. Patent No. 6,177,649 to Juret et al. ("Juret"). Claim 12 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Juret in view of U.S. Patent No. 4,083,223 to Hashimoto et al. ("Hashimoto"). Claims 7 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Juret in view of U.S. Patent Application Publication No. 2002/01724410 to Shepard ("Shepard"). Claims 8 and 19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Messler, Juret, and Shepard in view of U.S. Patent No. 4,214,264 to Traub et al. ("Traub"). Claims 24 and 28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Juret in view of U.S. Patent No. 6,299,346 to Ish-Shalom et al. ("Ish-shalom"). Claims 5-6, 16-17, and 31-34 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Juret in view of Shepard. Claim 27 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Juret in view of U.S. Patent No. 7,044,634 to Sandvoss ("Sandvoss"). Withdrawal of these rejections is respectfully requested for at least the following reasons.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

**A. Claims 1, 12, and 26-32**

The proposed combination of Messler and Juret does not disclose or suggest all of the limitations of claim 1. In particular, claim 1 recites the step of obtaining a thermal image as the weld is being formed by collecting infrared radiation passing through the second plastic piece of material from the weld and pool of material. The proposed combination of Messler and Juret does not disclose or suggest this feature.

Messler does not disclose or suggest obtaining a thermal image let alone a thermal image by collecting infrared radiation from a weld and pool of material. Messler discloses using a pyrometer 58 to detect the thermal radiation 60 emitted by the pool of material or weld 47. The pyrometer 58 does not obtain a thermal image as the weld is being formed. Furthermore, the pyrometer 58 does not detect thermal radiation from the solidified weld seam 15. Accordingly, the pyrometer 58 does not collect infrared radiation from the weld 15 and the pool of material 47. Messler also discloses two different measures for analyzing radiations from the already solidified, finished weld seam (see paragraphs [0010] and [0012]). In particular, Messler states that one measure uses an independent laser radiation 20 as the inspection radiation (see paragraphs [0011], [0026], and claim 2) and the other measure uses the laser radiation used to produce the weld seam as the inspection radiation (see paragraphs [0012], [0034], and claim 3). Messler discloses that for both measures during the measurement of the exit radiation, only the reflected radiation 33', 53 from an already solidified point 49 of the weld seam 15 that has been produced is detected and supplied to an evaluation unit (37) (see lines 8-12 from page 5 of claim 1). Messler

does not disclose that these measures are used to obtain a thermal image as the weld is being formed by collecting radiation passing through a second piece of material from the weld and pool of material.

Juret is related to an IR camera 6 that is specifically designed to provide thermal images of certain locations in relation to the fusion zone of two metal plates 1, 2 welded together end-to-end or slightly overlapped. Juret does not disclose obtaining a thermal image as the weld is being formed by collecting infrared radiation passing through the second piece of material from the weld and pool of material. Juret discloses that the camera 6 may observe a zone immediately ahead of a fusion zone or a zone providing a thermal image of the fused metal or a zone behind the fusion zone. Accordingly, the camera 6 does not observe infrared radiation from the weld and a pool of material.

The combination of Messler in view of Juret as suggested in the Office Action would not include obtaining a thermal image as a weld is being formed by collecting infrared radiation passing through a second piece of material from the weld and a pool of material since neither reference discloses or suggests collecting infrared radiation passing through a second piece of material from a weld and a pool of material.

Thus, in view of the above-mentioned reasons, claim 1 is allowable.

Claims 12 and 26-32 depend directly or indirectly from claim 1 and are therefore allowable as depending from an allowable claim and for their specific features recited therein.

**B. Claims 2-8**

Claim 2, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the step of obtaining a thermal image that includes, in its entirety, a weld pool that results in a weld. Neither Messler nor Juret taken either alone or in combination disclose or suggest this feature. Messler does not disclose or suggest obtaining a thermal image. Furthermore, the pyrometer of Messler only detects thermal radiation of a small pool of material and not an entire weld pool that results in a weld.

Juret is related to an IR camera that is designed to provide thermal images of certain locations in relation to the fusion zone of two metal plates being welded together end-to-end. The camera 6 observes a zone disposed immediately ahead of the advancing fusion zone, or a zone providing a thermal image at the fused metal, or a zone behind the advancing fusion zone. Juret does not disclose the step of obtaining a thermal image that includes, in its entirety, a weld pool that results in a weld. Therefore, claim 2 is allowable.

Claims 3-8 depend directly or indirectly from claim 2 and are therefore allowable as depending from an allowable claim and for the specific features recited therein.

**C. Claims 25 and 27**

Claim 25, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the additional feature recited therein. Claim 25 recites that the step of heating the first and second pieces at their location of abutment to form a pool of material at the location of abutment which pool of material

forms a weld between the pieces is performed by directing the laser beam over the path of the weld pool multiple times; and said modifying occurs during directing of the laser beam over the path during at least one of said multiple times. Neither Messler nor Juret disclose or suggest this feature.

In particular, neither Messler nor Juret disclose or suggest directing a laser beam over the path of the weld pool multiple times. In fact, Messler specifically teaches **not** directing the laser beam over the path of a weld pool multiple times. In particular, Messler specifically discloses that for the first method of Fig. 2, a laser beam 20 strikes two movable beam-deflecting mirrors 23, 24, which direct the laser beam to the workpiece 10 through a theta objective 35 and can produce the weld seam 15 by simultaneous welding (see paragraph [0024]). Messler specifically discloses that the laser beam 20 enters a processing head 50 and is collimated by a lens 45 in the method of Fig. 6. The beam then passes through two mirrors 43, 44 and is bundled by a collimator 46 and focused on a well-defined area 47 of the workpiece 10 (see paragraph [0033]). A melt 48 of both materials 18, 19 forms in the area of the focus 47. During movement of the workpiece 10 relative to the processing head 50, the focus moves along the workpiece, and the melt gradually undergoes solidification 49. The weld seam 15 forms in this way. (See beginning of paragraph [0034]). Thus, the laser beam is directed over the path, where the weld seam is formed, only once and not multiple times.

Juret discloses a high energy-density beam 4 from a beam generator that welds two metal plates at their joint. The beam-generator 3 is fixed to a frame member 5 that is displaceable in the direction of the plane of the joint of the metal

plates 1, 2 being welded. Juret discloses that the frame member 5 moves from left to right during welding of the plates. Juret fails to disclose or suggest directing the beam 4 over a path of a weld pool multiple times. Therefore, claim 25 is allowable.

Claim 27, which depends from claim 25, is allowable as depending from an allowable claim and for the specific features recited therein.

**D. Claim 33**

Claim 33, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the subject matter recited therein. Claim 33 recites obtaining a plurality of thermal images as the weld is being formed and stopping the obtaining of any thermal images of the weld after the weld is formed. Neither Messler nor Juret nor Shepard taken alone or in combination discloses or suggests this feature. Messler and Juret do not explicitly teach obtaining a plurality of images.

Shepard does not disclose stopping the obtaining of thermal images of the weld after the weld is formed. The examiner argues that it is inherent, that "Shepard would not take any images after the full image reconstructed, and there is no need to take more images".

Under the doctrine of inherency, if an element is not expressly disclosed in a prior art reference, the reference will still be deemed to include the missing element if the missing element is "necessarily present" in the item described in the reference.

Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268 (Fed. Cir. 1991).

"Necessarily present" for inherency means more than merely probably or possibly present. Trintec Industries, Inc. v. Top-U.S.A. Corp., 295 F.3d 1292, 1295 (Fed. Cir. 2002).

The step of stopping the obtaining of any thermal images of a formed sample is not “necessarily present” in the device of Shepard. Quite the contrary, the abstract of Shepard discloses the use of an infrared camera to capture multiple, spatially different images of a sample that has been heated and allowed to cool to equilibrium temperature. This indicates that a thermal image is taken after a sample is formed and allowed to cool. Therefore, claim 33 is allowable.

**E. Claims 13 and 24**

The proposed combination of Messler and Juret does not disclose or suggest all of the limitations of claim 13. In particular, claim 13 recites the step of obtaining a thermal image as the weld is being formed between the first plastic piece and the second plastic piece, which is transmissive to the laser beam, by collecting infrared radiation within the determined range of wavelengths from the weld and the pool of material. The proposed combination of Messler and Juret does not disclose or suggest this feature.

Messler does not disclose or suggest obtaining a thermal image, let alone a thermal image by collecting infrared radiation from a weld and pool of material. Messler discloses using a pyrometer 58 to detect the thermal radiation 60 emitted by the pool of material or weld 47. The pyrometer 58 does not obtain a thermal image as the weld is being formed. Furthermore, the pyrometer 58 does not detect thermal radiation from the solidified weld seam 15. Accordingly, the pyrometer 58 does not collect infrared radiation from the weld 15 and the pool of material 47. Messler also discloses two different measures for analyzing radiations from the already solidified, finished weld seam (see paragraphs [10010] and [10012]). In particular, Messler

states that one measure uses an independent laser radiation 20 as the inspection radiation (see paragraphs [0011], [0026], and claim 2) and the other measure uses the laser radiation used to produce the weld seam as the inspection radiation (see paragraphs [0012], [0034], and claim 3). Messler discloses that for both measures during the measurement of the exit radiation, only the reflected radiation 33', 53 from an already solidified point 49 of the weld seam 15 that has been produced is detected and supplied to an evaluation unit (37) (see lines 8-12, from page 5 of claim 1). Messler does not disclose that these measures are used to obtain a thermal image as the weld is being formed by collecting radiation passing through a second piece of material from the weld and the pool of material.

Juret is related to an IR camera that is designed to provide thermal images of certain locations in relation to the fusion zone of two metal plates being welded together end-to-end or slightly overlapped. Juret does not disclose obtaining a thermal image as the weld is being formed between a first plastic piece and a second plastic piece by collecting infrared radiation from a weld and a pool of material.

The combination of Messler in view of Juret as suggested in the Office Action would not include obtaining a thermal image as a weld is being formed by collecting infrared radiation passing through a second piece of material from the weld and a pool of material since neither reference discloses or suggests collecting infrared radiation passing through a second piece of material from a weld and a pool of material.



Furthermore, claim 13 should be allowed for the recited feature of heating first and second plastic pieces at their location of abutment by directing the laser beam over the path of a weld pool multiple times. Messler does not disclose or suggest this feature. The Examiner admits this too, but argues that this is inherent, "that the weld should be heated by the laser beam a plurality of times in order to create a weld having a desired length".

Claim 13 does not recite that the weld is heated by the laser beam a plurality of times at a plurality points in order to create a weld having a desired length. Rather, claim 13 specifically recites directing the laser beam over the path of a weld pool multiple times.

Further, this feature of claim 13 is not "necessarily present" in Messler. In fact, Messler specifically teaches **not** directing the laser beam over the path of a weld pool multiple times. In particular, Messler specifically discloses that for the first method of Fig. 2, a laser beam 20 strikes two movable beam-deflecting mirrors 23, 24, which direct the laser beam to the workpiece 10 through a theta objective 35 and can produce the weld seam 15 by simultaneous welding (see paragraph [0024]). Messler specifically discloses that the laser beam 20 enters a processing head 50 and is collimated by a lens 45 in the method of Fig. 6. The beam then passes through two mirrors 43, 44 and is bundled by a collimator 46 and focused on a well-defined area 47 of the workpiece 10 (see paragraph [0033]). A melt 48 of both materials 18, 19 forms in the area of the focus 47. During movement of the workpiece 10 relative to the processing head 50, the focus moves along the workpiece, and the melt gradually undergoes solidification 49. The weld seam 15

forms in this way. (See beginning of paragraph [0034]). Thus, the laser beam is directed over the path, where the weld seam is formed, only once and not multiple times. Accordingly, it is not inherent that Messler directs the laser beam over the path of a weld pool multiple times.

Juret discloses a high energy-density beam 4 from a beam generator that welds two metal plates at their joint. The beam-generator 3 is fixed to a frame member 5 that is displaceable in the direction of the plane of the joint of the metal plates 1, 2 being welded. Juret discloses that the frame member 5 moves from left to right during welding of the plates. Juret fails to disclose or suggest directing the beam 4 over a path of a weld pool multiple times.

Therefore, for the reasons set forth above, the rejection of claim 13 under 35 U.S.C. 103(a) fails to establish a prima facie case for obviousness.

Claim 24 depends from claim 13 and is therefore allowable as depending from an allowable claim and for the specific features recited therein.

#### **F. Claims 14-21**

Claim 14, which depends from claim 13, should be allowed for the same reasons as claim 13 and also for the step of obtaining a thermal image that includes, in its entirety, a weld pool that results in a weld. Neither Messler nor Juret taken either alone or in combination disclose or suggest this feature. Messler does not disclose or suggest obtaining a thermal image. Furthermore, the pyrometer of Messler only detects thermal radiation of small pool of material and not an entire weld pool that results in a weld.

Juret is related to an IR camera that is designed to provide thermal images of certain locations in relation to the fusion zone of two metal plates being welded together end-to-end. The camera 6 observes a zone disposed immediately ahead of the advancing fusion zone, or a zone providing a thermal image at the fused metal, or a zone behind the advancing fusion zone. Juret does not disclose the step of obtaining a thermal image that includes, in its entirety, a weld pool that results in a weld. Therefore, claim 14 is allowable.

Claims 15-21 depend directly or indirectly from claim 14 and are therefore allowable as depending from an allowable claim and for the specific features recited therein.

**G. Claim 34**

Claim 34, which depends from claim 13, should be allowed for the same reasons as claim 13 and also for the subject matter recited therein. Claim 34 recites obtaining a plurality of thermal images as the weld is being formed and stopping the obtaining of any thermal images of the weld after the weld is formed. Neither Messler nor Juret nor Shepard taken alone or in combination disclose or suggest this feature. Messler and Juret do not explicitly teach obtaining a plurality of images.

Shepard does not disclose stopping the obtaining of thermal images of the weld after the weld is formed. The examiner argues that it is inherent that "Shepard would not take any images after the full image reconstructed, and there is no need to take more images".

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the missing element is "necessarily present" in the item described in the reference.

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The step of stopping the obtaining of any thermal images of a formed sample is not "necessarily present" in the device of Shepard. Quite the contrary, the abstract of Shepard discloses the use of an infrared camera to capture multiple, spatially different images of a sample that has been heated and allowed to cool to equilibrium temperature. This indicates that a thermal image is taken after a sample is formed and allowed to cool. Therefore, claim 34 is allowable.

#### **H. Claims 35 and 36**


Claim 35, which depends from claim 25, should be allowed for the same reasons as claim 25 and also for the additional feature recited therein. Claim 35 recites that the path is a closed-curved shape, and wherein the step of heating the first and second pieces at their location of abutment to form a pool of material at the location of abutment which pool of material forms a weld between the pieces is performed by directing the laser beam around the path of the weld pool multiple times; and the modifying occurs during directing of the laser beam around the path during at least one of the multiple times. None of the cited references disclose or suggest this feature. In fact, the Office Action fails to cite any reference or even any reason to reject claim 35. Therefore, claim 35 is allowable.

Claim 36, which depends from claim 13, should be allowed for the same reasons as claim 13 and also for the feature recited therein. Claim 36 recites that the path is a closed-curved shape, and wherein the step of heating the first and second plastic pieces at their location of abutment is performed by directing the laser beam around the path of a weld pool multiple times to form a pool of material at their location of abutment which pool of material forms a weld between the pieces. None of the cited references disclose or suggest this feature. In fact, the Office Action fails to cite any reference or even any reason to reject claim 36. Therefore, claim 36 is allowable.

In view of the foregoing, it is respectfully requested that the application be allowed.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

  
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